

REMARKS

Careful consideration has been given to the Official Action of May 1, 2003 and reconsideration of the application as amended is respectfully requested.

The Examiner has rejected claims 1-5 under 35 U.S.C. § 103 (a) as being unpatentable over Matsubara et al. (U.S. Patent No. 6,509,651) in view of Pinnow et al. (U.S. Patent No. 3,699,478).

Claims 1-3 and 5 have been amended to correct minor grammatical errors contained therein. These claims are believed to be in condition for allowance. Claim 4 has been canceled. New claims 6-9 have been added. Claim 6 is an independent claim and includes the limitations in claims 1 and 4. Claims 7-9 correspond to claims 2, 3 and 5 respectively and are dependent on claim 6. Pending claims 1-3 and 5-9 as now presented are distinguishable over the cited art, taken singly or in combination as will be explained in detail hereafter.

The present invention is directed to a pink light-emitting device with high brightness. The device comprises a light-emitting diode as a luminescent element and a fluorescent body comprising yttrium aluminum garnet floorescent powders with the formula $(Y_{3-x-y}Ce_xZ_y)Al_{15}O_{12}$ or $(Y_3Ce_xZ_y)Al_{15}O_{12}$, wherein said light-emitting diode emits a purple to blue light with a wavelength ranging from 400 nm to 450 nm, $0 < x \leq 0.8$, $0.5 < y \leq 2.5$, and Z is selected from the group consisting of rare earth metals other than cerium (Ce). The fluorescent powders are excited by the purple to blue light emitted from the light emitting diode (LED) to emit an orange-yellow to orange light with a wavelength ranging from 575 nm to 585 nm. The combination of the purple to blue light (400 nm - 450 nm) with the orange-yellow to orange light (575 nm to 585 nm) produces a pink light with uniformly

distributed color.

In contrast with the present invention, Matsubara et al. disclose a pink light emitting device comprising a light emitting diode with a ZnSe substrate. Specifically, according to embodiments 1 and 2 of Matsubara et al., a pink-color LED can be produced by a synthesized light including 480 nm blue + 630 nm red or 465 nm blue + 600 nm red respectively. (Column 13, line 56, column 14, line 53, and figures 6 and 8) These are clearly outside the range of the claims which recites the purple to blue light having a wavelength ranging from 400 nm - 450 nm in combination with the orange-yellow to orange light having a wavelength ranging from 575 nm - 585 nm.

Pinnow is cited in combination with Matsubara et al. for its disclosure of the fluorescent powders. Pinnow discloses a black and white display apparatus, wherein a laser emits at a wavelength of $.4416 \mu$ (cadmium ion laser) or 488μ (argon ion laser), and an excitation spectrum between $.3 \mu$ and $.53 \mu$ to excite the phosphorescent composition and to fluoresce essentially white. (Fig. 1) In other words, according to Pinnow's teaching, the phosphorescent composition absorbs light having a wavelength ranging from 300 nm to 530 nm and fluoresces essentially white, rather than emitting an orange-yellow to orange light as in the present invention.

In rejecting the claims, the Examiner cites Matsubara et al. for disclosing a pink light emitting device with high brightness comprising a light emitting diode as a luminescent element and a fluorescent body comprising yttrium aluminum garnet (YAG) fluorescent powders. The Examiner acknowledges that Matsubara et al. do not disclose the fluorescent powders with the claimed formula. The Examiner cites Pinnow for disclosing those fluorescent powders, and since Pinnow discloses that these compositions are used based

largely on economic considerations, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Pinnow's phosphor composition in Matsubara et al. in order to maximize efficiency and minimize cost.

The rejection is respectfully traversed because Pinnow discloses an LED for producing white light with a combination of a laser and the YAG powder composition. It does not follow that merely because the YAG powders are known in Pinnow to produce white light that these could be used with a completely different luminescent element to produce pink light.

In fact, Matsubara et al. is specifically directed to LEDs containing no YAG phosphor. (Column 7, lines 4-8) Matsubara et al. found that LEDs containing YAG phosphor to be disadvantageous, pointing out three drawbacks associated with such LEDs. (Column 3, lines 36-55) These drawbacks include "the extra YAG raises the material cost and the production cost" and "YAG is suffering from low efficiency" (Column 3, lines 39-40 and lines 50-55) Hence, Matsubara et al. seek to provide LEDs containing no YAG phosphor in order to avoid such drawbacks. Therefore, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to have used Pinnow's phosphor composition in Matsubara et al. in order "to maximize efficiency and minimize cost" as alleged by the Examiner because Matsubara et al. disclose precisely the opposite.

Although Matsubara et al. do disclose two embodiments (1 and 2) which are capable of emitting pink light, it is more broadly directed to LEDs capable of producing neutral colors such as pink, redpurple, orange, yellow, or white color. (Column 1, lines 5-11) It is worth noting that all of Matsubara et al.'s discussion of LEDs containing YAG (columns 2 and 3) are background information relating to the existing state of the art. Within that context,

Matsubara et al. acknowledge that white color LED can be made by "assembling a high luminous blue LED having a GaInN active layer and a YAG" phosphor of yellow. All discussions in Matsubara et al. of LEDs containing YAG phosphor are directed to the prior art in which LEDs emit white color light.

Since Pinnow discloses a white light emitting device, and Matsubara et al. merely acknowledge that white color LEDs containing YAG are known, if one combines Pinnow and Matsubara et al., one would reasonably expect to produce a white color LED instead of the pink color LED as disclosed by the present invention.

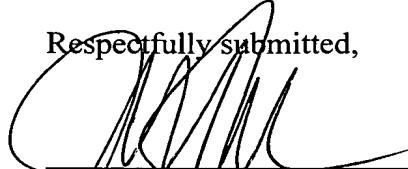
According to M.P.E.P 706.02(j), in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.

Therefore, it would not have been obviously to one of ordinary skill in the art at the time the invention was made to use Pinnow's phosphor composition in the device of Matsubara et al. not only because Matsubara et al. teach away from using YAG phosphor in LEDs, but because there is no predictability or suggestion that the phosphors of Pinnow would produce pink light in the Matsubara device. Therefore, it is respectfully submitted that the Examiner's rejection of the claims under 35 U.S.C. § 103 (a) is erroneous.

On the basis of the above action and remarks, it is respectfully submitted that the

application is in allowable condition and favorable reconsideration is earnestly solicited.

Respectfully submitted,


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